CAL MARITIME
GOLDEN BEAR FACILITY

THE GLOSTEN ASSOCIATES
Consulting Engineers Serving the Marine Community

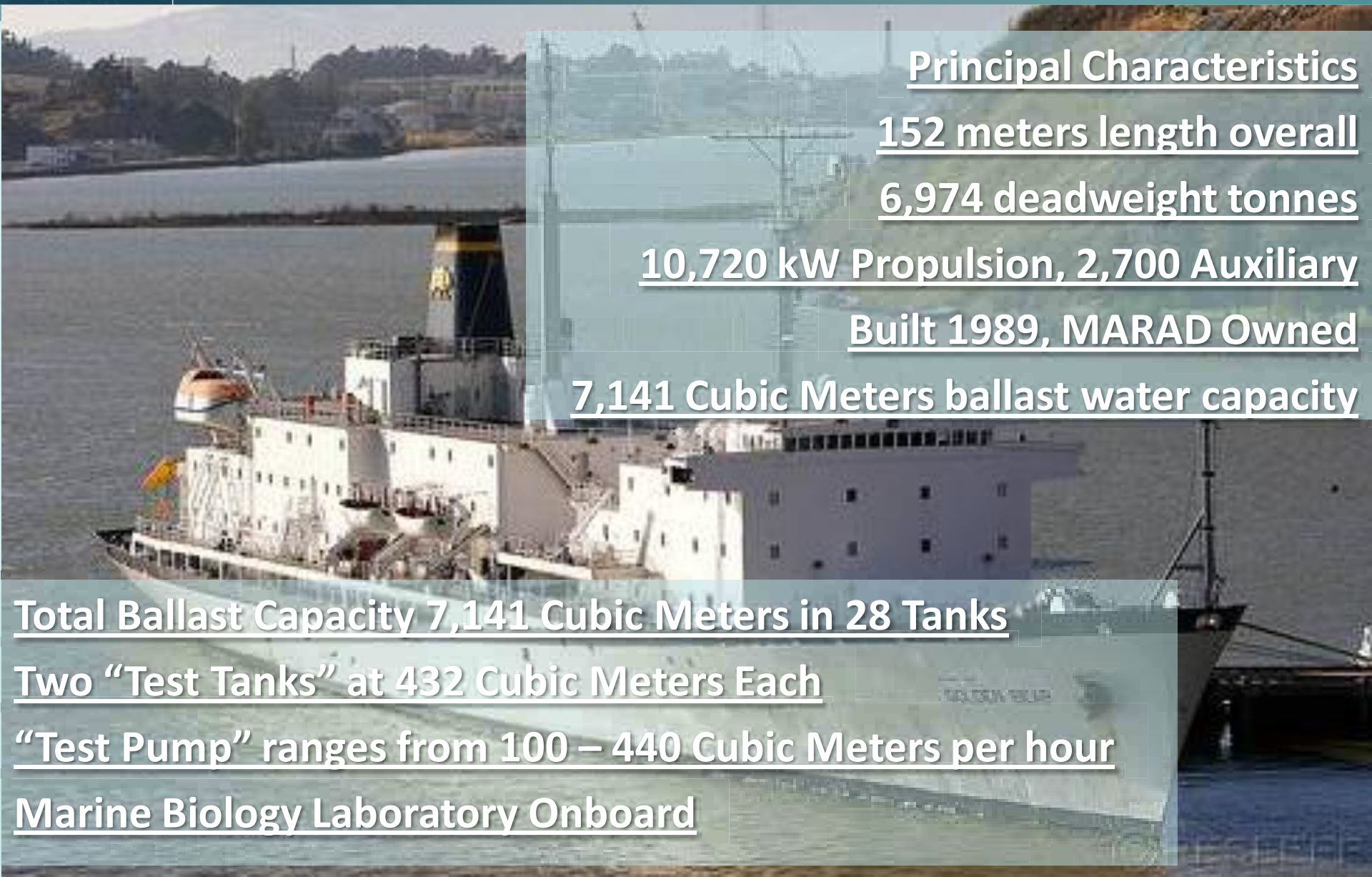
Golden Bear Facility

Developing a Shipboard Ballast Treatment Test Facility

Presented to:
Prevention First, California State Lands Commission
19 October 2010, Long Beach, California

Presented by: Kevin J. Reynolds, PE, The Glosten Associates

Golden Bear Facility



Principal Characteristics

152 meters length overall

6,974 deadweight tonnes

10,720 kW Propulsion, 2,700 Auxiliary

Built 1989, MARAD Owned

7,141 Cubic Meters ballast water capacity

Total Ballast Capacity 7,141 Cubic Meters in 28 Tanks

Two "Test Tanks" at 432 Cubic Meters Each

"Test Pump" ranges from 100 – 440 Cubic Meters per hour

Marine Biology Laboratory Onboard

Golden Bear Facility
-Program Development Phases

- **Phase 1 – Concept and Feasibility**
  - **UW Lead with CMA, MARAD, and Glosten Support**
  - **Funded by NOAA SeaGrant (2005)**
- **Phase 2 – Basic Facility Design and Engineering**
  - **Glosten Lead with CMA, UW, and MARAD Support**
  - **Funded by NOAA SeaGrant (2008)**
- **Phase 3 – Basic Facility Construction**
  - **CMA Lead, with Glosten Engineering Support**
  - **Funded by NOAA, State Lands, MARAD (2009)**
- **Phase 4 – Shipboard Testing (IMO G8 Guidelines)**
  - **CMA Lead with Moss Landing Marine Lab (MLML) & Glosten**
  - **Funded by Severn Trent De Nora BalPure (May – Dec 2010)**
- **Phase 5 – Enhanced Capabilities**
  - **CMA Lead with Glosten & MLML Support**
  - **Funded by MARAD (Jan 2010 – May 2011)**
- **Phase 6 – Land-based Testing (ETV Protocol)**
  - **Golden Bear Facility (CMA, MLML, and Glosten)**
  - **Funded by EPA/USCG ETV Program (Aug 2010 – Mar 2011)**

Golden Bear Facility
Mission of Marine Vessel Sustainability Center at Cal Maritime

Center's Mission

- Provide an effective platform, for the research, development, testing and evaluation of technologies and practices which reduce marine vessel environmental impacts.
- Advance United States merchant shipping and environmental technology business interests.
- Develop stewards of the environment through Cal Maritime student education, community involvement, and maritime business outreach

Golden Bear Facility – Shipboard Platform for Center

- Meets IMO G8 Guidelines for Shipboard Testing of Ballast Water Treatment Systems (BWTS).
- Will meet EPA/USCG requirements for Land-based Testing of BWTS (following Fall 2010 modifications).
- Provides working ship platform with onboard Marine Biology Laboratory, for Research and Development. Project could include BWTS, Hull Fouling Solutions, Waste Heat Recovery Solutions, Sanitation Device Solutions.

Golden Bear Facility
Partnerships

Current Team

- California Maritime Academy
  - Sponsored Projects – Administration
  - Ship Operations – Construction and Testing Logistics
- Moss Landing Marine Laboratories – Home Science Team
- The Glosten Associates – Program Management and System Engineering

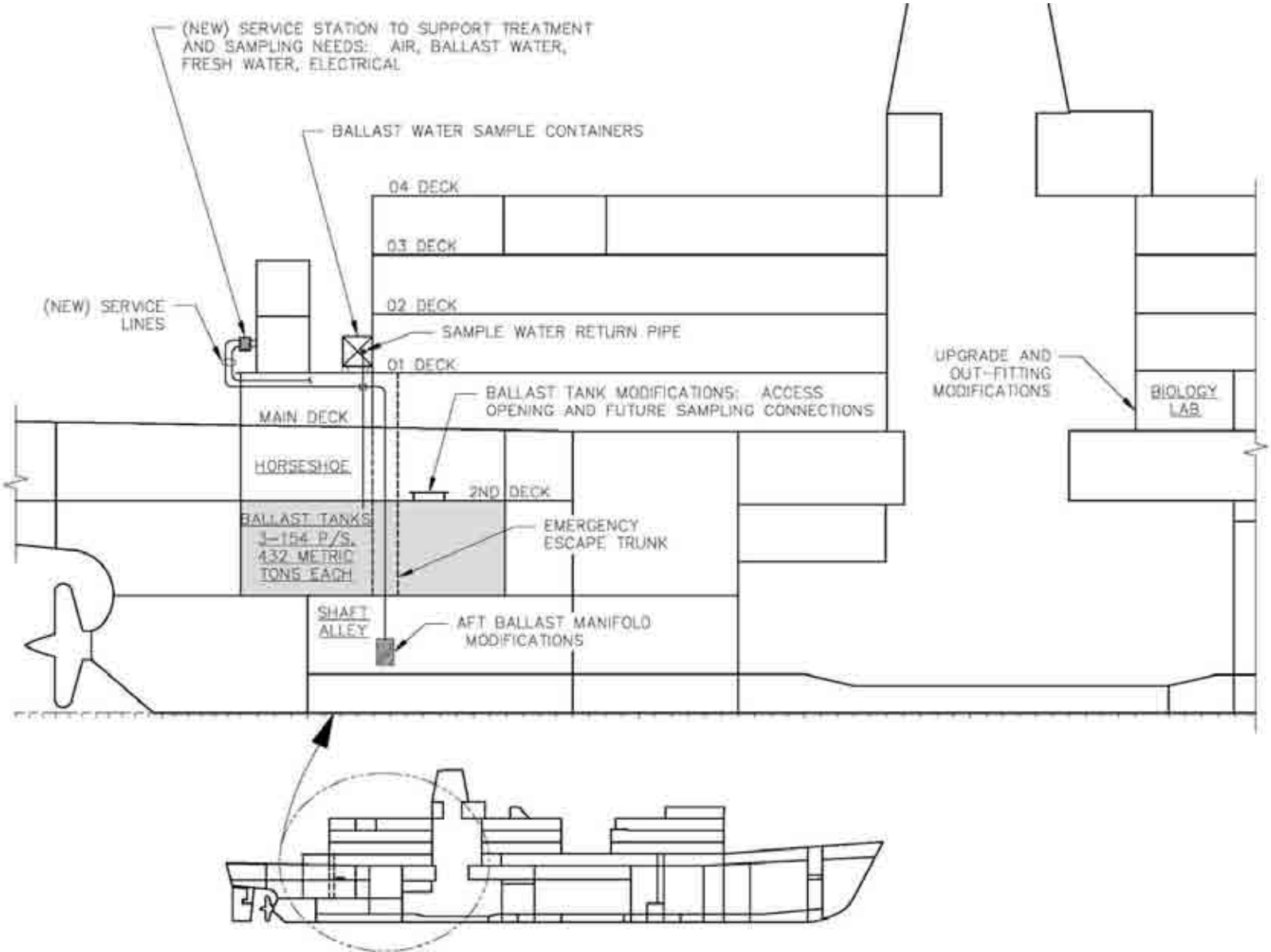
Project Sponsors

- U.S. Maritime Administration – Funding Facility Enhanced Capabilities
- California State Lands Commission – Funded Facility Start-up
- NOAA SeaGrant – Funded Facility Start-up
- The Glosten Associates – Supported Facility Start-up Planning (In Kind)
- ITT Process and Controls/Beckwith & Kuffel Seattle – Donated Key Equipment
- ABS – Donated Plan Review Services

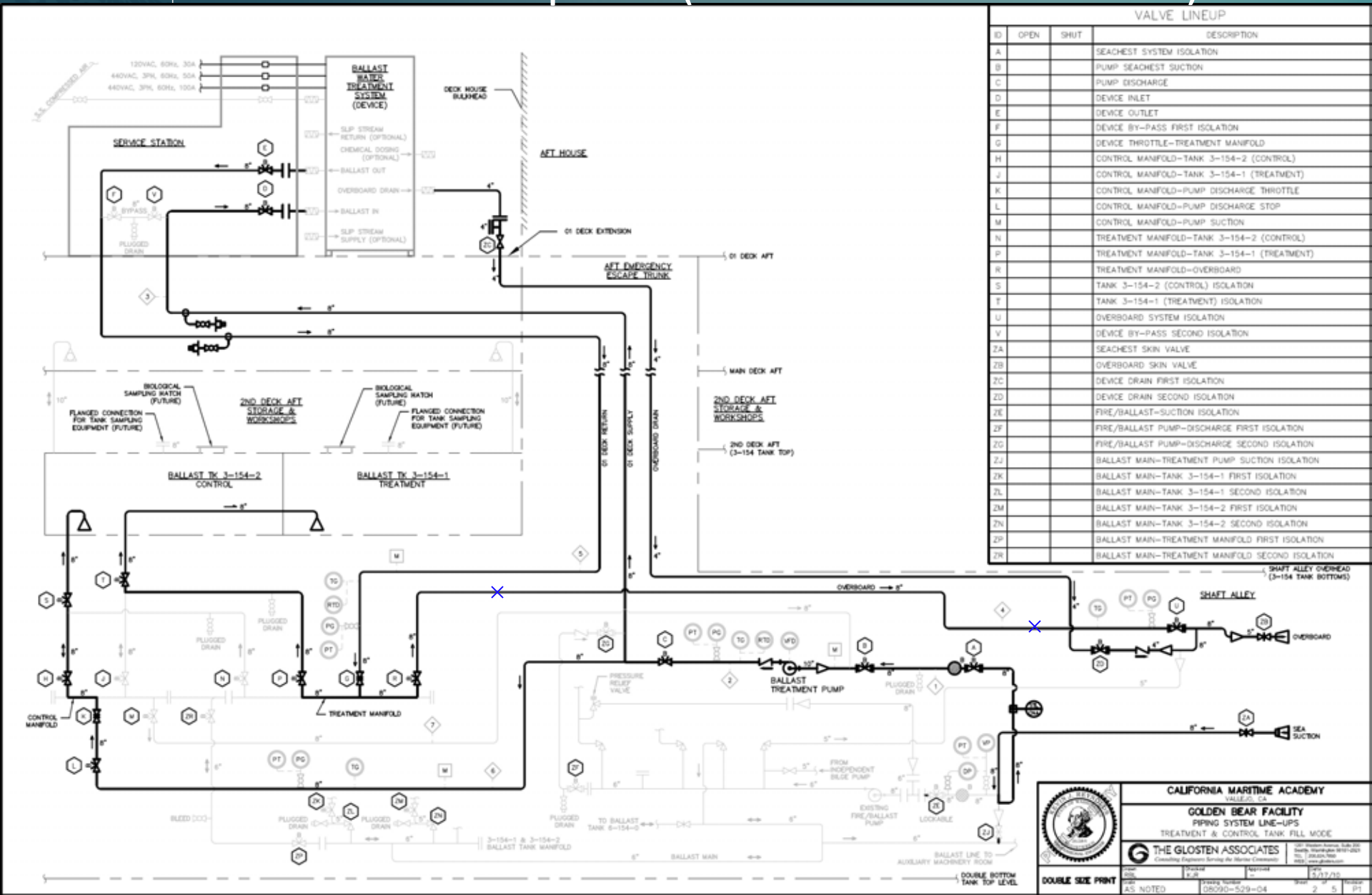
Emeritus Team

- University of Washington – Originated Concept, and Performed Initial Feasibility Study and Planning

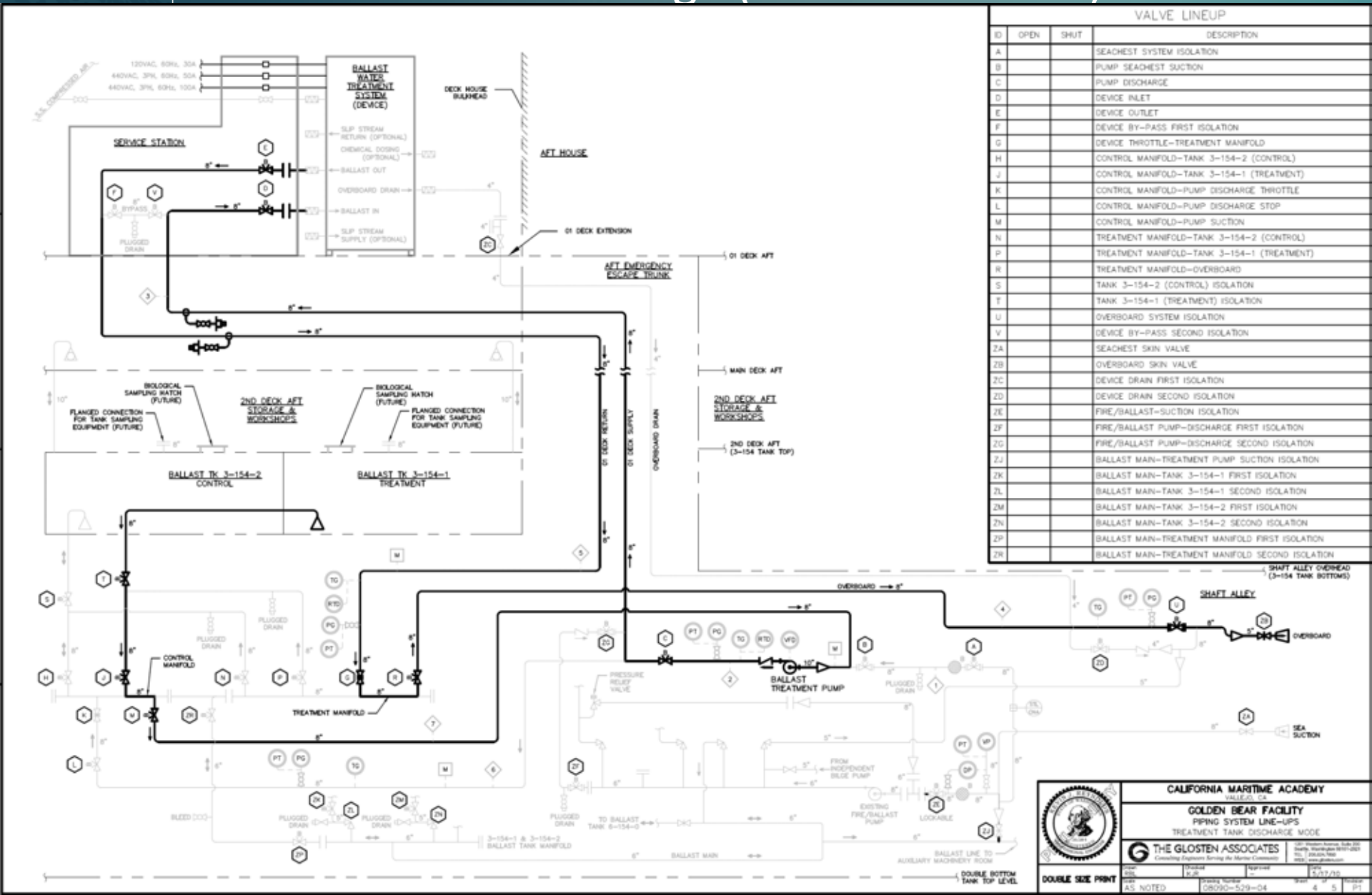
Golden Bear Facility
-Profile View of Key Testing Facilities



Golden Bear Facility
-Ballast Water Uptake (Treatment and Control)



Golden Bear Facility
-Ballast Water Discharge (Treatment Tank)

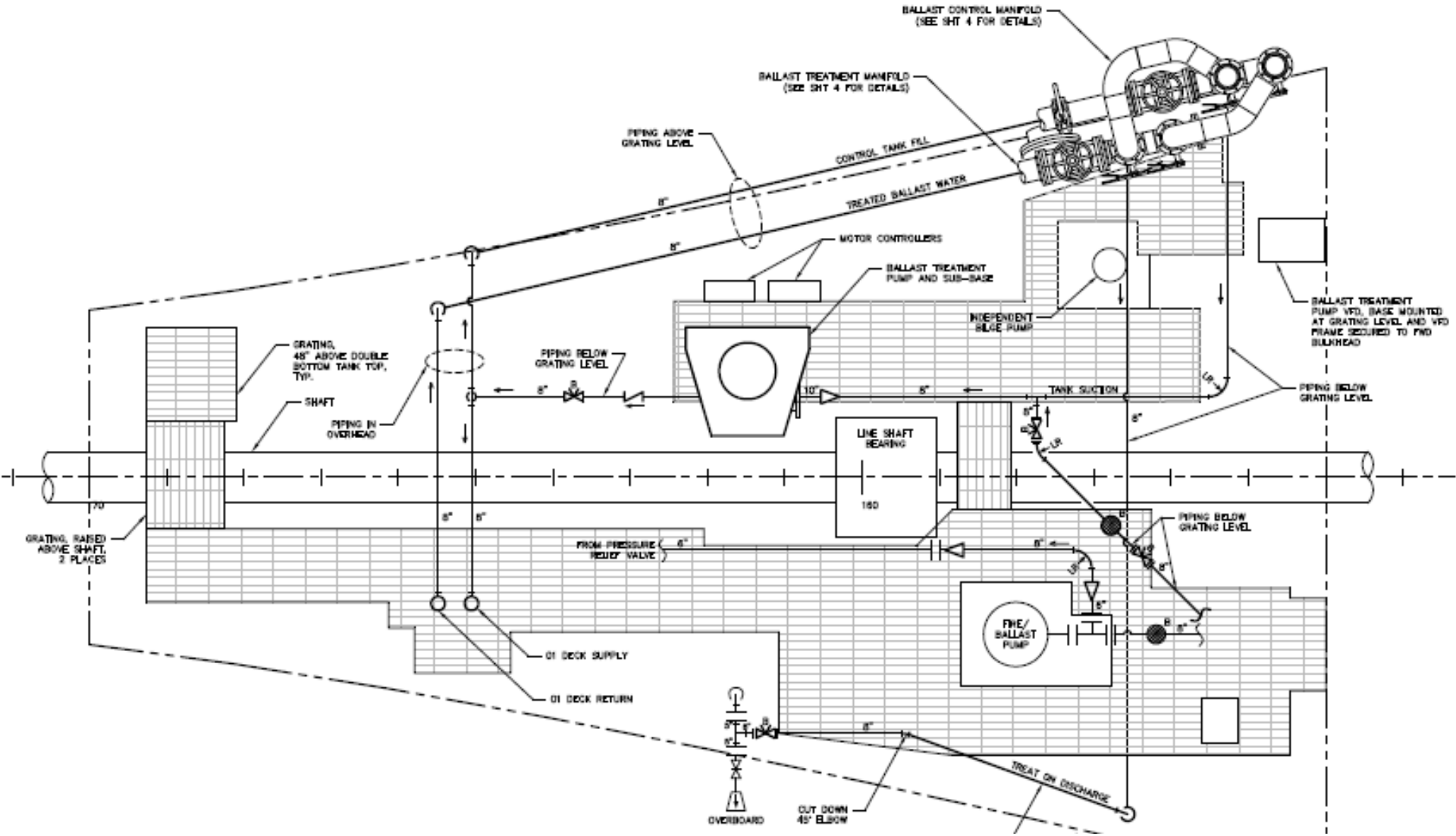


VALVE LINEUP

ID	OPEN	SHUT	DESCRIPTION
A			SEACHEST SYSTEM ISOLATION
B			PUMP SEACHEST SUCTION
C			PUMP DISCHARGE
D			DEVICE INLET
E			DEVICE OUTLET
F			DEVICE BY-PASS FIRST ISOLATION
G			DEVICE THROTTLE-TREATMENT MANIFOLD
H			CONTROL MANIFOLD-TANK 3-154-2 (CONTROL)
J			CONTROL MANIFOLD-TANK 3-154-1 (TREATMENT)
K			CONTROL MANIFOLD-PUMP DISCHARGE THROTTLE
L			CONTROL MANIFOLD-PUMP DISCHARGE STOP
M			CONTROL MANIFOLD-PUMP SUCTION
N			TREATMENT MANIFOLD-TANK 3-154-2 (CONTROL)
P			TREATMENT MANIFOLD-TANK 3-154-1 (TREATMENT)
R			TREATMENT MANIFOLD-OVERBOARD
S			TANK 3-154-2 (CONTROL) ISOLATION
T			TANK 3-154-1 (TREATMENT) ISOLATION
U			OVERBOARD SYSTEM ISOLATION
V			DEVICE BY-PASS SECOND ISOLATION
ZA			SEACHEST SKIN VALVE
ZB			OVERBOARD SKIN VALVE
ZC			DEVICE DRAIN FIRST ISOLATION
ZD			DEVICE DRAIN SECOND ISOLATION
ZE			FIRE/BALLAST-SUCTION ISOLATION
ZF			FIRE/BALLAST PUMP-DISCHARGE FIRST ISOLATION
ZG			FIRE/BALLAST PUMP-DISCHARGE SECOND ISOLATION
ZJ			BALLAST MAIN-TREATMENT PUMP SUCTION ISOLATION
ZK			BALLAST MAIN-TANK 3-154-1 FIRST ISOLATION
ZL			BALLAST MAIN-TANK 3-154-1 SECOND ISOLATION
ZM			BALLAST MAIN-TANK 3-154-2 FIRST ISOLATION
ZN			BALLAST MAIN-TANK 3-154-2 SECOND ISOLATION
ZP			BALLAST MAIN-TREATMENT MANIFOLD FIRST ISOLATION
ZR			BALLAST MAIN-TREATMENT MANIFOLD SECOND ISOLATION

CALIFORNIA MARITIME ACADEMY
VALLEJO, CA
GOLDEN BEAR FACILITY
PIPING SYSTEM LINE-UPS
TREATMENT TANK DISCHARGE MODE
THE GLOSTEN ASSOCIATES
Consulting Engineers Serving the Marine Community
DOUBLE SIZE PRINT
AS NOTED
08090-529-04
5/17/10

Golden Bear Facility
-Plan View of Shaft Alley Equipment



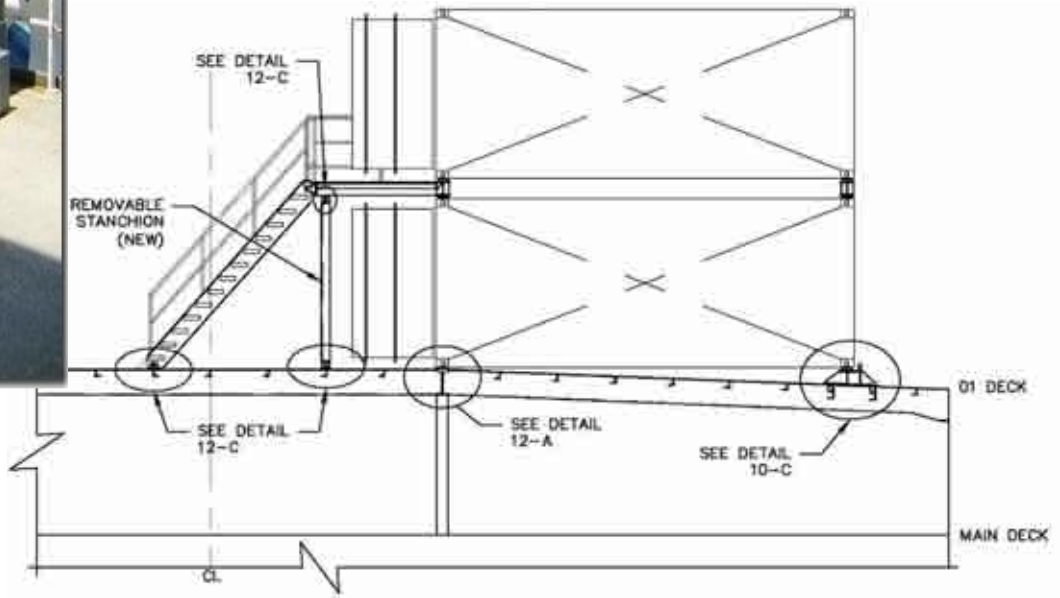
Golden Bear Facility
-Views of BWTS Service Station

Structural modifications allow placement of one or two 20’ ISO containers in stacked arrangement.

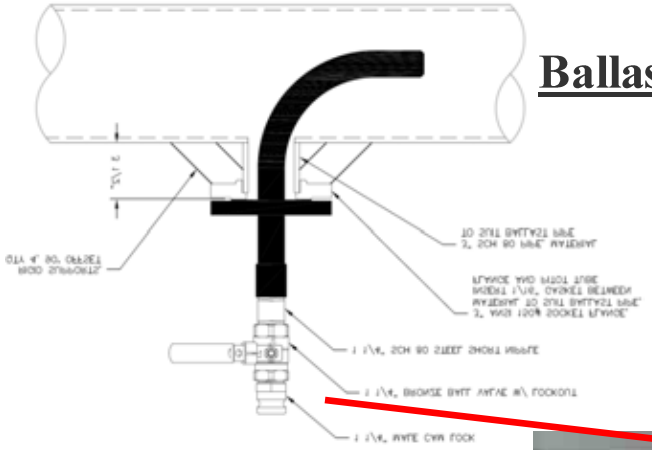
Containers may weight up to 25 tons total.

Proximity to 20 ton deck crane for handling.

Services provide compressed air, fresh water, electrical, ballast main, and drain connections.



Golden Bear Facility
-Sampling System



Ballast Main (8 inch)

Sampling Capabilities:

Two independent sets of sampling tanks

Each with triplicate samples, continuous integrated sampling

Typical samples 3 sets of 1.2 cubic meters each.

Capacity for 3 sets of 3.3 cubic meters each.

Sampling Pitot Tubes: 1-1/4 inch, 1-1/2 inch, And 2 inch

Golden Bear Facility
-Sampling System In Use

Golden Bear Facility
-Onboard Marine Biology Laboratory

Golden Bear Facility
-CMA Cadet Interaction and Outreach

Golden Bear Facility
-Organization and Contact Information

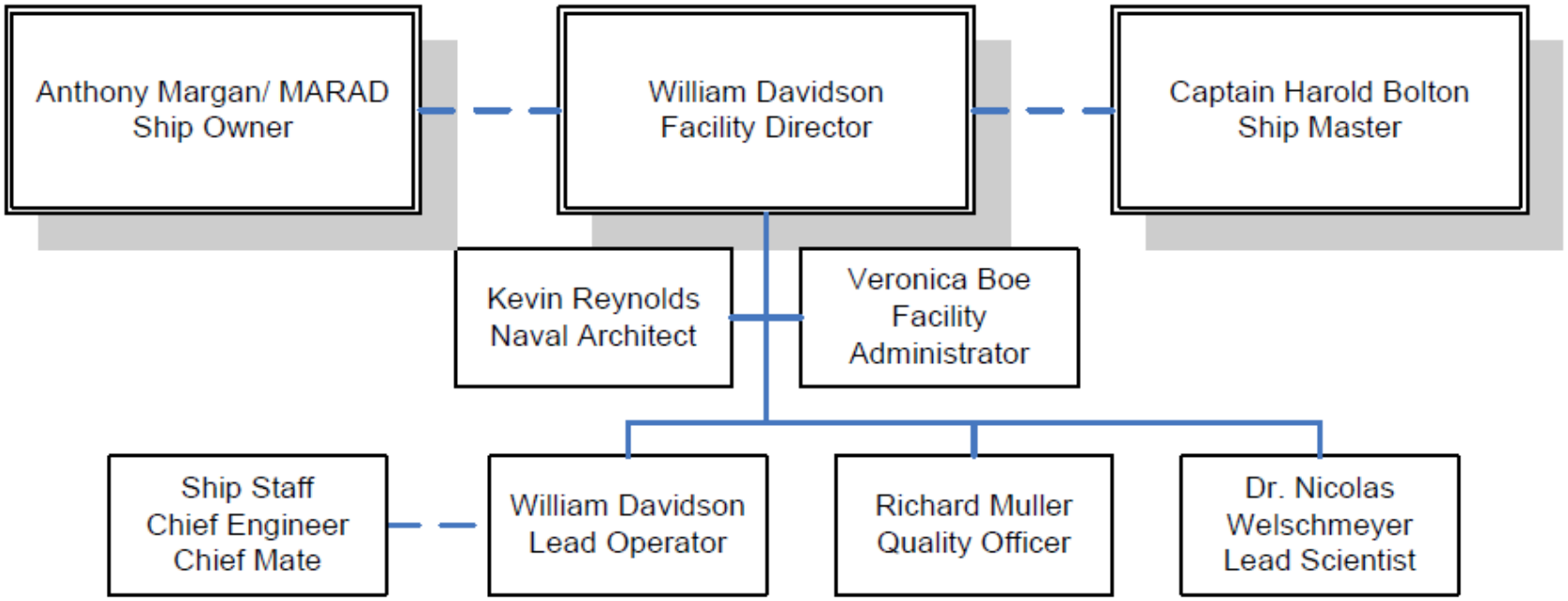


Figure 1. Facility Organization Chart

Contacts:

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Ballast Installation Engineering: Kevin Reynolds (kjreynolds@glosten.com)

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